The Permanente Medical Group, Inc.

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February 16, 1996

David Werdegar, MD, MPH
Director
OSHPD
1600 9th Street
Sacramento, CA 95814

Dear Dr. Werdegar:

The letter of response from Kaiser Permanente Medical Care Program includes comments referable to the methodology for obstetric assessment, even though the published report from OSHPD will focus on cardiac care. This reflects our understanding that this is the only mechanism available to address in the public forum our concern about the former topic.

Thank you,

Richard B. Rabens, MD
Director, Quality & Utilization

cc: Andye Zach
Health Policy & Planning Division, Rm. 350

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July 28, 1995

David Werdegar, M.D., MPH, Director
Office of Statewide Health Planning and Development
1600 Ninth Street, Room 433
Sacramento, California 95814

Dear Dr. Werdegar:

Kaiser Permanente Northern California is totally committed to improving the quality of care provided in our hospitals and to the use of clinical outcomes to this end. Therefore we are very interested in the Hospitals Outcomes Report issued by OSHPD and its contractors. We have reviewed carefully the draft report sent to hospitals for review. This year, we have focused on the obstetric outcomes analysis since it is the only new analysis added. We have identified some issues regarding this analysis which we think are important and we hope that OSHPD and its contractors will consider these points in preparing the final report. These issues include the validity of readmission rates as an outcome measure, the problem of selection bias in the vaginal and C-section models, and the problem of omitted variables bias in the combined outcomes model.

As the report states, OSHPD's contractors excluded from the analysis certain readmissions based upon a list of ICD-9 diagnosis codes which were deemed not to represent complications of the delivery. We asked a multidisciplinary team at each hospital to review all cases which had a readmission within six weeks to determine whether the readmission was related to the delivery or not. A number of these readmissions were found not to result from a complication of the delivery. The numbers per hospital are listed in Table 1 below. Partly this is the result of coding guidelines which suggest including post-partum in any readmission occurring during the post-partum period. Therefore a discharge could be given a principal diagnosis which includes the term post-partum even if the readmission is unrelated to the delivery. When the readmission is unrelated to the delivery, it obviously has no meaning as a measure of quality of hospital care. In Appendix A, we list some of the principle diagnoses associated with these readmissions. OSHPD may want to extend its list of diagnoses not representing complications of delivery based on this list.

The second issue we raise concerns the problem of selection bias in the analytic model used in the obstetric outcomes study. This report includes three outcomes (readmission) models: one for vaginal deliveries alone, one for C-sections alone, and one for combined deliveries. We submit that the vaginal delivery alone and the C-section alone models are biased due to varying rates of C-sections in different hospitals. Hospitals with lower C-section rates perform C-sections on women who might have more severe complications than hospitals with a higher C-section rate.

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TABLE 1

Hospital	# Vag Re -admits	# not Comp- lications	# Ques- tionable	# C-Sect Readmits	# Not Comp- lications	# Ques- tionable
Hayward	36	12	0	12	2	0
Oakland	15	0	0	7	0	0
Redwood City	6	3	0	3	1	0
Sacramento	9	4	0	5	1	0
Santa Clara	24	3	0	6	1	0
Santa Rosa	18	2	0	3	1	0
Santa Teresa	10	2	0	8	0	0
Vallejo	14	4	1	13	1	1
Walnut Creek	15	2	3	8	1	3

This difference in practice regarding C-sections across hospitals affects the comparisons of readmission rates using the separate models because the C-section patients are not selected randomly from the population at risk for C-section at each hospital. Patients whose risk status would lead to a C-section in a high C-section rate (HCSR) hospital are part of the separate C-section model for the HCSR hospital but not for hospitals with a low C-section rate (LCRS).

This problem is generally referred to as selectivity, and it is a problem when the same patient characteristics (i.e., health status) are determinants of both the probability of having a C-section and of being readmitted for a complication. Because C-section patients are not randomly selected from the overall population of patients at a hospital, the expected value of the error term in the outcome model is not zero. A fuller description of this problem is found in Appendix B.

If no such bias exists, we should expect that overall the C-section rate at a hospital would be unrelated to the readmission rate at a hospital. We do not have the results for all the hospitals in the state, but for the ten Kaiser Northern California hospitals, we did look to see if there was any correlation between the C-section rate and the average risk-adjusted readmission rates. We divided the ten hospitals into two groups based on their C-section rate, then looked at their average risk-adjusted readmission rates for vaginal, C-section, and combined models (Table 2).

TABLE 2
READMISSION RATES BY HIGHER OR LOWER C-SECTION RATES

Average C-Section Rate	Average Risk-Adjusted Outcome Vaginal Model	Average Risk-Adjusted Outcome C-Section Model	Hospital Group	Average Risk-Adjusted Outcome Combined Model
18.7	.56	1.3	Higher C-Section Rate	.78
15.2	.9	2.3	Lower C-Section Rate	1.2

In each case, the average risk-adjusted outcome (averaged over five hospitals in each case) is higher for the group of low C-section hospitals than for the group of high C-section hospitals. This table suggests that either hospitals with lower C-section rates provide a lower quality of hospital care, or that these risk-adjusted outcome rates are biased due to a biased expected readmission rate. Since the literature suggests that a lower C-section rate demonstrates higher quality of care, not lower, we suggest that OSHPD explore this relationship among all the hospitals in the data set and determine whether this is a result of selection bias. Since Northern California Kaiser hospitals have lower C-section rates than other hospitals in the state, we are very interested in this issue.

A third issue we wish to raise concerns the variables used in the mode of delivery model to predict whether a delivery would be a C-section or not. Through an instrumental variable approach, the mode of delivery model was used to produce a predicted probability of having a C-section, which was used as a regressor in the combined outcome model. The contractors state in the report that they omitted several variables from the mode of delivery model. We are concerned that some

important predictors of the probability of C-section were omitted, leading to the danger of omitted variables bias in this analysis.

For example, a California study has shown that source of payment for the delivery is a predictor of C-section, with uninsured and Medi-Cal insured women having lower probabilities of having C-sections than privately insured women (Stafford, 1990). Studies have also shown lower C-section rates in public as compared to private hospitals. But neither expected source of payment nor hospital type was included in the mode of delivery model. The contractors explained that they omitted some variables from the mode of delivery model because they were in the outcome model. However, simply omitting a variable from a model does not mean that it no longer is a determinant of the mode of delivery, and leads to biased estimates of the included variables. A fuller description of the omitted variables bias problem is in Appendix C.

The size of this bias is unknown. Some studies have found it to be fairly minimal. We strongly suggest that the contractors evaluate this issue and determine whether, and to what extent, omitting source of payment and other hospital characteristics variables produced a bias in the outcomes models. If the bias is tested for and found to be small or non-existent, then the outcomes report is on much stronger ground. If the bias is significant, the contractors could include the omitted variables to remove the bias.

A fourth issue with this analysis is whether or not the instrumental variable used in the combined model, the predicted probability of C-section, is a good instrumental variable. The literature on the instrumental variable method specifies the characteristics of a good instrumental variable--it should be correlated with the treatment, in this case, the actual C-section rate, but should be uncorrelated with the outcome.

To determine whether this variable is a good instrumental variable, the contractors should divide the sample of vaginal deliveries into groups based on their predicted probability of C-section, and then see whether the readmission rates of these groups shows a correlation with the predicted probability of C-section. If it shows no correlation, then it is probably an adequate instrumental variable, but if it is correlated with the outcome, it is not. This analysis should be part of the report since this instrumental variable is so critical in this analysis. We examined the distribution of the predicted probability of readmission in those cases with a readmit, and those without, and found that the mean value was significantly higher in the group with readmissions. The main difference appears to be in the high end of the distribution of predicted probability of readmission.

A fifth issue with this analysis is the rarity of readmissions, and the impact of this rarity on the confidence intervals, especially for hospitals with a small number of deliveries. The contractors do address this issue in the documentation, but still the issue remains. If the outcomes were presented with both their point estimate, and their confidence intervals, we would feel more comfortable, since the wide band around results for smaller hospitals would be instantly obvious.

Finally, we wish to raise the issue of the impact of this hospital outcomes report on hospital

practice in the future. A fundamental problem with using readmissions as an outcome measure is that the decision to readmit is a conscious decision made by agents of the hospital, in a sense reflecting a practice pattern itself. It is not a true outcome measure in the sense that death is, for example. This leads to the uncomfortable realization that hospitals could decide it was in their best interest not to readmit women for complications of delivery if at all avoidable.

While we would hope that no hospital would choose not to admit a woman who really required hospital care, in reality the admissions process is a rather ambiguous one, and there is a range in which the decision to readmit could be argued for and against. We all hope that that decision is made based only on the clinical factors presented by the woman, and not based on concerns about how the hospital will fare in the next OSHPD Hospital Outcomes Report. But in these days of tremendous competition among hospitals for market share, we cannot be assured this will be the case, and therefore are concerned about the use of such measures as indicators of hospital quality.

In fact, the State of California, through contract with the Community and Organizational Research Institute (CORI) in Santa Barbara, has for several years been producing the Risk-Adjusted Perinatal Mortality Rate Report. This was a very strong outcome indicator, in that death is not a practice pattern decision, and the model used a Bayesian adjustment to correct for the problem of small cell sizes.

In Kaiser Permanente Northern California, we have used this report as a tool to improve the quality of our perinatal care and the improved outcomes can be seen in the trends of this indicator. We regret that this report is no longer being produced by CORI, and strongly suggest that OSHPD or the Department of Health Services make sure that this excellent work does not disappear in California.

Sincerely,

Richard Rabens

Richard Rabens, M.D.
Director of Quality and Utilization

Denise Runde/RR

Denise Runde
Quality Leader

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